

Customer No.: 31561
Docket No.: 10788-US-PA
Application No.: 10/709,923

REMARKS

Present Status of the Application

Present pending claims 6-14 are rejected. Specifically, claims 6-8, 10, 13, and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Asai et al. (U. S. Patent 6,534,723; hereinafter Asai) in view of Sakuyama et al. (U. S. Patent 6,689,639; hereinafter Sakuyama) and Degani et al. (U. S. Patent 5,564,617; hereinafter Degani). In addition, claim 9 is rejected under 35 U. S. C. 103(a) as being unpatentable over Asai in view of Sakuyama and Degani and further in view of Acocella et al. (U. S. Patent 5,591,941; hereinafter Acocella). Claim 11 is rejected under 35 U. S. C. 103(a) as being unpatentable over Asai in view of Sakuyama and Degani and further in view of Gansauge et al. (U. S. Patent 5,244,833; hereinafter Gansauge). Claim 12 is rejected under 35 U. S. C. 103(a) as being unpatentable over Asai in view of Sakuyama, Degani, and further in view of Benwnati et al. (U. S. Patent 6,177,729; hereinafter Benenati). Claims 6-14 remain pending in the present application, and reconsideration of those claims is respectfully requested.

Discussion of Claim Rejections under 35 USC 103

1. Claims 6-8, 10, 13, and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Asai in view of Sakuyama and Degani. In addition, claim 9 is rejected under 35 U. S. C. 103(a) as being unpatentable over Asai in view of Sakuyama and Degani and further in view of Acocella. Claim 11 is rejected under 35 U. S. C. 103(a) as being unpatentable over Asai in view of Sakuyama and Degani and further in view of Gansauge. Claim 12 is rejected under 35 U. S. C. 103(a) as being unpatentable over Asai in view of Sakuyama, Degani, and further in

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view of Benwnati. Applicants respectfully traverse the rejections for at least the reasons set forth below.

2. As previously discussed, with respect to independent claim 6, *the bump 226 are formed on the contact 210 of the substrate 200 but not over the bonding pad 222 and the metal layer 224 of the chip 220.* In other words, the bump is formed on the substrate but not on the chip with the at least the advantages of low-cost (par. [0029]). Independent claim 6 has clearly recited that *the bumps are formed on the substrate but not on the chip.* The bonding pads of the chip are then connected to the bumps by flip-chip manner.

It should be further noted that, the metal layer 224 in additionally formed on the bonding pad of the chip.

More particularly to claim 14, the Ni metal layer is formed by electroless plating on the bonding pad.

Dependent claims 7-14 also include the foregoing features.

3. As previously stated, Asai in FIGs. 8, 10, and 11 discloses the electronic component 82, such as LST chip (col. 19, line 9), having been formed with the solder bumps (solder ball 84) while the solder bumps 62, 96 are also formed on the circuit board (col. 5, lines 16-21; col. 26, lines 40; Fig. 18).

In other words, Asai specifically requires the solder bump 84 be formed on the chip. However, this solder bump 84 on the chip 82 is not necessary in the present invention, so as to reduce the cost.

The Office Action notes that Asai fails to disclose the full features of the present invention.

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4. In re Sakuyama, as shown in Fig. 3C and Fig. 5, clearly the bump 41 is formed on the chip X, and then the chip X is connected to the wiring board 70 (col. 10, lines 27-29). Therefore, Sakuyama failed to disclose the emphasized feature recited in claim 6.

Further, the electrode 11 is a part of the semiconductor device X (chip) for forming the bumps thereon. The electrode 71 is formed on the wiring board only at one surface.

Again, the Office Action has noted that the chip carries the bumps.

5. In re Degani, see FIG. 3, the chip 35 has solder wettable metal pad 37 (col. 5, lines 50-52). As can be understood, the solder wettable metal pad 37 is the I/O bonding pad. The solder wettable metal pad 37 does not specifically disclose the additional metal layer, such as Ni layer, on the bonding pad, as recited in the present invention. Therefore, Degani does not modify Asai and Sakuyama into the present invention as at least recited in independent claim 6 or even further in dependent claim 14.

6. With respect to claim 9, the Office Action further cites Acocella in combination with Asai, Sakuyama and Degani for rejections. Applicants respectfully disagree.

In re Acocella, the Office Action cites Acocella about implanting tin globes and treating surface of the first contact with a flux before implanting the tin globes. However, the bumps 18 are formed on the substrate 10 of chip in Acocella. Therefore, Acocella does not provide the missing features of Asai with Sakuyama and Degani in the parent independent claim 6. Claim 9 is therefore allowable for at least the same reasons.

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7. With respect to claim 11, the Office Action further cites Gansauge in combination with Asai, Sakuyama and Degani for rejections. Applicants respectfully disagree.

In re Gansauge, again in Fig. 6, the bumps 34 and 36 are formed on the silicon substrate 10 (col. 65, lines 7-8). The chip connection terminals 28 are formed above the contact pads 14. Likewise, Gansauge does not provide the missing features of Asai with Sakuyama and Degani in the parent independent claim 6. Dependent claim 11 is therefore allowable for at least the same reasons.

8. With respect to claim 12, the Office Action further cites Benenati in combination with Asai, Sakuyama and Degani for rejections. Applicants respectfully disagree.

In re Benenati, the rolling ball connector is disclosed. However, Benenati does not disclose that the bumps are formed on the substrate as recited in independent claim 6. Indeed, as shown in Fig. 4c and Fig. 5b of Benenati, the ball 20 is formed on the chip 26. Benenati failed to provide the missing features of Asai with Sakuyama and Degani in the parent independent claim 6.

For at least the foregoing reasons, Applicants respectfully submit that independent claim 6 patently defines over the prior art references, and should be allowed. For at least the same reasons, dependent claims 7-14 patently define over the prior art references as well.

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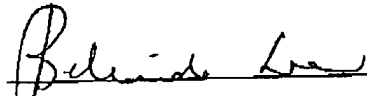
CONCLUSION

For at least the foregoing reasons, it is believed that all the pending claims 6-14 of the invention patently define over the prior art and are in proper condition for allowance. If the Examiner believes that a telephone conference would expedite the examination of the above-identified patent application, the Examiner is invited to call the undersigned.

Respectfully submitted,

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